

WHAT IS CLAIMED IS:

1. An ozonizing unit comprising an electrode plate including:
 - a dielectric substrate, and
 - a pair of electrodes formed on one surface of the dielectric substrate.
2. The ozonizing unit according to claim 1, wherein a dielectric layer is formed on the surface of the dielectric substrate so as to cover the pair of electrodes.
3. The ozonizing unit according to claim 1 further comprising:
 - a gas guide facing to the surface of the electrode plate on the side of the pair of electrodes at a predetermined distance from the same surface, and a cooling structure fixedly joined to the other surface of the electrode plate.
4. The ozonizing unit according to claim 1, wherein each of the pair of electrodes has linear electrode elements, and the respective electrode elements of the pair of electrodes are arranged alternately at a predetermined interval.
5. The ozonizing unit according to claim 4, wherein the thickness of the dielectric substrate is greater than the interval between the electrode elements.
6. The ozonizing unit according to claim 4, wherein the widths of the respective electrode elements of the pair of electrodes are 200 μm or below.
7. The ozonizing unit according to claim 1, wherein the pair of electrodes are disposed in an overlapping manner, and an intermediate dielectric layer is interposed between the pair of electrodes.
8. An ozonizing unit according to claim 1 further

comprising:

a gas guide facing to and spaced through spacers from the surface of the electrode plate on the side of the pair of electrodes so as to form a discharge space into which a gas is supplied; and

a cooling structure having a cooling water chamber and disposed on the other surface of the electrode plate on the opposite side of the surface of the same provided with the electrodes;

wherein a holding plate is disposed through elastic members on a surface of the gas guide on the opposite side of the electrode plate, and the cooling structure and the holding plate are fastened together by fastening means at positions outside the electrode plate and the gas guide.

9. An ozonizing unit comprising:

a cooling structure having a cooling water chamber;

a pair of electrode plates disposed on the opposite surfaces of the cooling structure, each having a dielectric substrate, at least one electrode set of first and second electrodes having electrode elements formed at predetermined intervals on one surface of the dielectric substrate, and serving as surface discharge electrodes;

gas guides disposed through spacers on the surfaces of the electrode plates provided with the electrode set so as to form discharge spaces, respectively; and

holding plates disposed through elastic members on surfaces of the gas guides on the opposite side of the electrode plates, respectively.

10. The ozonizing unit according to claim 9, wherein the pair of holding plates are fastened together by fastening means at positions outside the cooling structure, the pair of gas guides and the pair of electrode plates.

11. The ozonizing unit according to claim 9, wherein the pair of holding plates and the cooling structure are

fastened together by fastening means at positions outside the pair of gas guides and the pair of electrode plates.

12. The ozonizing unit according to claim 8 or 9, wherein an ozone discharging space is formed in peripheral parts of the electrode plates and the gas guides, and ozone discharge holes are formed in the holding plates so as to be connected to the ozone discharging space.

13. The ozonizing unit according to claim 8 or 9, wherein a recess conforming to the shape of the electrode plate is formed in a surface of the cooling structure on the side of the electrode plate.

14. The ozonizing unit according to claim 8 or 9, wherein the spacers are made of an ozone-resistant metal.

15. The ozonizing unit according to claim 8 or 9, wherein the spacers are made of an ozone-resistant insulating material.

16. An ozone generator comprising a plurality of ozonizing units stacked one after another, each of said ozonizing units comprising:

an electrode plate including a dielectric substrate, and a pair of electrodes formed on one surface of the dielectric substrate;

a gas guide facing to and spaced through spacers from the surface of the electrode plate on the side of the pair of electrodes so as to form a discharge space into which a gas is supplied;

a cooling structure having a cooling water chamber and disposed on the other surface of the electrode plate opposite the surface of the same provided with the pair of electrodes; and

a holding plate placed through elastic members placed on a surface of the gas guide on the opposite side of the electrode

plate.

17. An ozone generator comprising a plurality of ozonizing units stacked one after another, each of said ozonizing units comprising:

a cooling structure having a cooling water chamber;

a pair of electrode plates placed on opposite surfaces of the cooling structure, each having a dielectric substrate, and at least a pair of electrodes serving as surface discharge electrodes and having electrode elements formed at predetermined intervals on one surface of the dielectric substrate;

gas guides disposed through spacers on the surfaces of the electrode plates provided with the pairs of electrodes so as to form discharge spaces into which a gas is supplied, respectively; and

holding plates disposed through elastic members on surfaces of the gas guides on the opposite side of the electrode plates;

wherein the holding plates of the ozonizing units are fastened together by fastening means.

18. The ozone generator according to claim 16 or 17, wherein

the holding plates of the ozonizing units at the opposite ends of the ozone generator are held on posts, the ozonizing units and the posts are disposed in a pressure vessel, and slide guides are laid inside and outside the pressure vessel so that the posts slides along the slide guides.

19. The ozone generator according to claim 17, wherein a cooling structure having a cooling water chamber is disposed between the ozonizing units, a pair of electrode plates, each including a dielectric substrate, and at least a pair of electrodes serving as surface discharge electrodes and having electrode elements formed at predetermined intervals on one surface of the dielectric substrate are placed on opposite surfaces of the cooling structure, and gas guides are disposed

through spaces on the surfaces of the electrode plates provided with the pairs of electrodes so as to form discharge spaces into which a gas is supplied.

20. A ozone generator comprising:

an ozonizing unit comprising:

an electrode plate including a dielectric substrate, and a pair of electrodes formed on one surface of the dielectric substrate;

a gas guide disposed through spacers on the surface of the electrode plate provided with the pair of electrodes so as to form a discharge space into which a gas is supplied;

a cooling structure having a cooling water chamber and disposed on the other surface of the electrode plate; and

a holding plate placed through elastic members on a surface of the gas guide on the opposite side of the electrode plate; or

an ozonizing unit comprising:

a cooling structure having a cooling water chamber;

a pair of electrode plates placed on opposite surfaces of the cooling structure, each including a dielectric substrate and at least a pair of electrodes serving as surface discharge electrodes and having electrode elements formed at predetermined intervals on one surface of the dielectric substrate;

gas guides disposed through spacers on the surfaces of the electrode plates provided with the pairs of electrodes so as to form discharge spaces into which a gas is supplied, respectively; and

holding plates placed through elastic members on surfaces of the gas guides on the opposite side of the electrode plates; and

at least one device selected from the group consisting of an ultraviolet irradiating device, a hydrogen peroxide producing device, a catalytic decomposing device, a radiation generating device and an ultrasonic generating device.

21. The ozone generator according to claim 20 further

comprising:

a gas supply system for supplying a source gas containing oxygen;

an adsorbing device for adsorbing moisture contained in the source gas or gaseous components of the source gas other than oxygen; and

a contact device for bringing generated ozone into contact with at least water or a gas.

22. An ozone-processing system comprising:

(A) an ozone generator comprising:

(a₁) an ozonizing unit comprising:

an electrode plate including a dielectric substrate, and a pair of electrodes formed on one surface of the dielectric substrate;

a gas guide disposed through spacers on the surface of the electrode plate provided with the pair of electrodes so as to form a discharge space into which a gas is supplied;

a cooling structure having a cooling water chamber and disposed on the other surface of the electrode plate, and

a holding plate placed through elastic members on a surface of the gas guide on the opposite side of the electrode plate; or

(a₂) an ozonizing unit comprising:

a cooling structure having a cooling water chamber;

a pair of electrode plates placed on opposite surfaces of the cooling structure, each including a dielectric substrate and at least a pair of electrodes serving as surface discharge electrodes and having electrode elements formed at predetermined intervals on one surface of the dielectric substrate;

gas guides disposed through spacers on the surfaces of the electrode plates provided with the pairs of electrodes so as to form discharge spaces into which a gas is supplied, respectively; and

holding plates placed through elastic members on surfaces of the gas guides on the opposite side of the electrode plates; and

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- (a₃) at least one device selected from the group consisting of an ultraviolet irradiating device, a hydrogen peroxide producing device, a catalytic decomposing device, a radiation generating device and an ultrasonic generating device; and
- (B) a purifying device comprising: at least one device selected from the group consisting of an activated charcoal filtration tank containing activated charcoal, a filtration tank and a membrane filtration device;
- (C) wherein water or a gas processed by ozone produced by the ozonizing unit is passed through the purifying device or water or a gas passed through the purifying device is brought into contact with the ozone.

23. The ozonizing unit according to claim 8 further comprising: further electrode plates placed on the cooling structure.

24. The ozonizing unit according to claim 23, wherein an ozone discharging space extending through the cooling structure, the gas guide and the holding plate is formed between the plurality of electrode plates.

25. An ozonizing unit comprising:
at least a pair of cooling structure, each having a cooling water chamber;
a pair of electrode plates placed on surfaces of the cooling structure facing each other, and each having a dielectric substrate, and at least a pair of electrodes serving as surface discharge electrodes and having electrode elements arranged at equal intervals on one surface of the dielectric substrate; and
spacers interposed between the cooling structures.

26. The ozonizing unit according to claim 25, wherein the cooling structures are fastened together at positions outside the electrode plates by fastening means.

27. The ozonizing unit according to claim 25 further

comprising: further electrode plates placed on each of the cooling structures.

28. The ozonizing unit according to claim 27, wherein an ozone discharging space extending through the cooling structures is formed between the plurality of electrode plates.

29. An ozone generator comprising a plurality of electrode plates stacked one after another, each of the electrode plates having a dielectric substrate, a pair of electrodes formed on one surface of the dielectric substrate.

30. The ozone generator according to claim 29, wherein a cooling heat exchanger is interposed between the adjacent electrode plates, respectively.

31. The ozone generator according to claim 30, wherein a discharge space is formed between the cooling heat exchanger and the electrode plate.

32. The ozone generator according to claim 29, wherein a sealing member is disposed between the adjacent electrode plates to form a discharge space with each electrode plate.

33. The ozone generator according to claim 29, wherein a sealing member is disposed on one side of each electrode plate, a cooling heat exchanger is disposed on the other side of the electrode plate, and a discharge space enclosing the electrode plate is formed by the sealing member disposed on one side of the electrode plate and the cooling heat exchanger disposed on the other side of the electrode plate.

34. The ozone generator according to claim 29, wherein sealing members are disposed between the adjacent electrode plates, and a discharge space enclosing the electrode plate is formed by one sealing member disposed on one side of the electrode plate and the other sealing member disposed on the

other side of the electrode plate.

35. The ozone generator according to claim 29, wherein the plurality of electrode plates are disposed in a pressure vessel.

36. An ozonizing unit comprising an electrode plate including:

a dielectric substrate;

a hot electrode and a stray electrode, each having linear electrode elements formed on one surface of the dielectric substrate; and

a back electrode formed on the other surface of the dielectric substrate so that a voltage is applied across the hot electrode and the back electrode.

37. The ozonizing unit according to claim 36, wherein the back electrode is formed over the entire area of the other surface of the dielectric substrate.

38. The ozonizing unit according to claim 36, wherein a dielectric layer is formed on one front surface of the dielectric substrate so as to cover the hot electrode and the stray electrode.

39. The ozonizing unit according to claim 36, wherein two linear electrode elements of the stray electrode are interposed between the adjacent linear electrode elements of the hot electrode.

40. The ozonizing unit according to claim 36, wherein the back electrode has linear electrode elements.

41. The ozonizing unit according to claim 36, wherein dielectric substrate has a circular shape, the respective electrode elements of the hot electrode and the stray electrode are formed in a pattern of concentric circles or a pattern of

a spiral.

42. An ozonizing unit comprising an electrode plate including:

a dielectric substrate;

a hot electrode having linear electrode elements formed on one surface of the dielectric substrate; and

a back electrode having linear electrode elements formed on the other surface of the dielectric substrate along a direction intersecting the electrode elements of the hot electrode so that a voltage is applied across the hot electrode and the back electrode.

43. The ozonizing unit according to claim 42, wherein a stray electrode having linear electrode elements is formed on one surface of the dielectric substrate so that the linear electrode elements thereof extend along a direction intersecting the linear electrode elements of the back electrode.

44. An ozonizing unit comprising an electrode plate including:

a dielectric substrate;

a hot electrode having linear electrode elements formed on one surface of the dielectric substrate; and

an additional electrode formed on one surface of the dielectric substrate so that a voltage is applied across the hot electrode and the additional electrode.